NUTANIX

NUTANIX PRIVATE CLOUD DESIGN GUIDE:

Storage Consolidation

Consolidate Storage and **Simplify** Storage Management with **Nutanix Private Cloud**

To deliver on business needs and accelerate digital transformation, enterprises need private cloud infrastructure that offers the simplicity and scalability of public clouds and the security and control of on-premises datacenters. However, many private cloud deployments on traditional IT infrastructure have deficiencies in key areas, resulting in:

• Unexpected high costs and lack of cost control
• Insufficient business continuity
• Cumbersome or brittle automation
• Complex, siloed storage infrastructure

Built on the industry's leading hyperconverged infrastructure (HCI) software, Nutanix private cloud solutions address these limitations and extend easily to encompass hybrid cloud deployments.

Intelligent storage enables you to offer advanced file, object, and block data services to IT users without adding infrastructure complexity

Private Cloud Creates Unique Storage Challenges

A private cloud has diverse storage needs. This is an area where traditional infrastructure creates big challenges. If you design a private cloud with separate storage systems to address block, file, and object storage requirements, these silos add complexity to your private cloud, increase OpEx and CapEx, and make automation difficult. With multiple, isolated storage pools, capacity planning is more challenging, and utilization and efficiency are low.
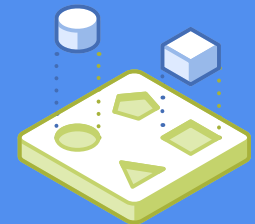
Enterprises need a private cloud with block and file storage services in addition to the object storage common in the public cloud. Having separate storage pools for each not only decreases overall capacity utilization, it limits flexibility.

A private cloud with a rigid architecture and complex data storage environment also makes automation harder. As a result, it is more time consuming to automate common workflows. Automation failures are more likely, and troubleshooting and maintenance are more time consuming.

The negative consequences of the traditional approach to data storage mount quickly:
- Silos of infrastructure reduce the utility of your data, making it difficult to access and analyze information across different sources.

- Proprietary management interfaces require training and expertise for each system, with different data protection and upgrade procedures—frequently including manual, error-prone, steps.

- Forklift migrations are required to move between hardware generations.

- The time, effort, and money spent managing data and infrastructure may not be commensurate with the value you extract from it.

- You are unable to fully address your transformation goals, increase customer engagement, optimize business operations, or catalyze new business models.

With data playing such a critical role in digital transformation, the importance of addressing these challenges shouldn't be overlooked.

A Platform for Data Services

Nutanix private cloud solutions allow you to consolidate all your data services on a single HCI platform, eliminating the need to architect and manage separate siloed storage solutions for your private cloud. A single, flexible and scalable storage pool simplifies provisioning and management, increases capacity utilization, and makes it simple to offer block, file, and object data services as part of a service catalog accessible to IT users.

Self-service access provides users with the data services they need without the involvement of IT, enabling users to avoid resource delays, while giving IT teams time to do more important work. A private cloud with Nutanix data services offers a number of advantages:

- **Data consolidation.** All data is consolidated on the same platform, increasing efficiency, simplifying management and data protection, and facilitating access and analysis across diverse data sets.

- **Space-efficiency.** All data services take advantage of Nutanix HCI capabilities for storage efficiency including erasure-coding, compression, and deduplication, allowing you to store more data using less raw capacity.

- **Flexibility.** You can deploy data services on the same HCI cluster as other private cloud services or dedicate one or more clusters to address unstructured and/or structured data storage needs.

- **Resiliency.** All data services benefit from the core resiliency and availability of the Nutanix HCI platform. Nutanix Files and Objects are clustered services that scale up or out on the HCI platform.

- **Simplified monitoring and management.** All data services can be monitored and managed from Nutanix Prism. Built-in snapshots, clones, replication, and other tools simplify data management tasks.

- **No forklift upgrades.** The need to rip and replace storage hardware every 3-5 years remains a key storage challenge. Nutanix HCI, with integrated data services, eliminates the need for painful hardware migrations.

Find Out More:
- Nutanix Private Cloud Solution

- Private Cloud Demo (video)

- Data Services Platform
  – Solution Brief
  – Blog

Nutanix Files—Intelligent File Services

Private cloud file services should provide centralized access to files from a secure environment for greater collaboration, higher productivity, better delivery of digital services, and expedited provisioning. Many enterprise applications, such as SAP, require shared file services. Development teams often need file shares for shared tools, and cloud users need a central data repository for collaboration and synchronized user profiles for end-user computing.

With conventional infrastructure, if you want to add file services to your private cloud you need a standalone file server or a Network Attached Storage (NAS) appliance. However, these can be difficult to set-up and operate, require specialized skills, and create additional infrastructure silos that add complexity, make automation more challenging, and reduce the utility of your data.

Nutanix private cloud integrates file services using Nutanix Files, a software-defined scale-out file storage solution that supports both Server Message Block (SMB) and Network File System (NFS) protocols. Files is designed to address a wide range of use cases.

Files

Simple, flexible and intelligent enterprise file storage for your private cloud

Nutanix Files delivers software-defined high availability, massive scale, easy self-service management, self-tuning, self-healing, and integrated data analytics—right out of the box.

- **Simple to deploy.** With Nutanix Files you can enable private cloud users to deploy file services or a new share in minutes without significant storage expertise.

- **Scalable.** NAS devices and file servers offer only limited scaling. Nutanix Files makes it easy to scale both performance and capacity.

- **Elastic.** Users can consume file storage when they need it and free it for other purposes when they don't.

- **Reliable and resilient.** Nutanix Files delivers the full resiliency benefits of Nutanix HCI including self-healing.

- **Data-aware.** Nutanix Files includes an integrated data analytics engine providing greater visibility and actionable insights for file data, including anomaly detection and predictive remediation of threats and risks.

Nutanix Files uses file server VMs running on Nutanix HCI to handle client connections. These file server VMs have access to the entire storage pool and can grow capacity on-demand. The Files architecture allows seamless performance scaling either by adding more file server VMs, or by increasing the CPU and memory resources allocated to each file server VM.

Multiple Files instances can be created in a private cloud, providing true multi-tenancy with complete security and namespace isolation. Each namespace can support billions of files and tens of thousands of users. User quotas are fully supported.

File Server Clients

File Server Clients

Nutanix Files gives you the flexibility to deploy it as part of a single Nutanix HCI cluster or as a standalone cluster to deliver high capacity and density for large-scale file services. A standalone cluster can function as part of your private cloud and/or serve other needs.

Find Out More:
- nutanix.com/files
- Nutanix Files data sheet
- Solving the unstructured data management problem

Nutanix Objects

Object storage is being deployed for a growing number of enterprise use cases. If you need a private cloud capable of supporting both traditional enterprise applications and modern cloud native applications, at some point you will need object storage.

Nutanix Objects is a software-defined object storage solution that can be deployed as part of a Nutanix HCI cluster, enabling non-disruptive scale-out while lowering costs. Objects can handle terabytes to petabytes of unstructured data and supports WORM functionality for immutability and chain of custody control.

Designed for backup, long term retention/archiving, Splunk and other big data workloads, and cross-region DevOps teams, Nutanix Objects gives your private cloud the flexibility to meet the needs of private cloud users and your IT team alike.
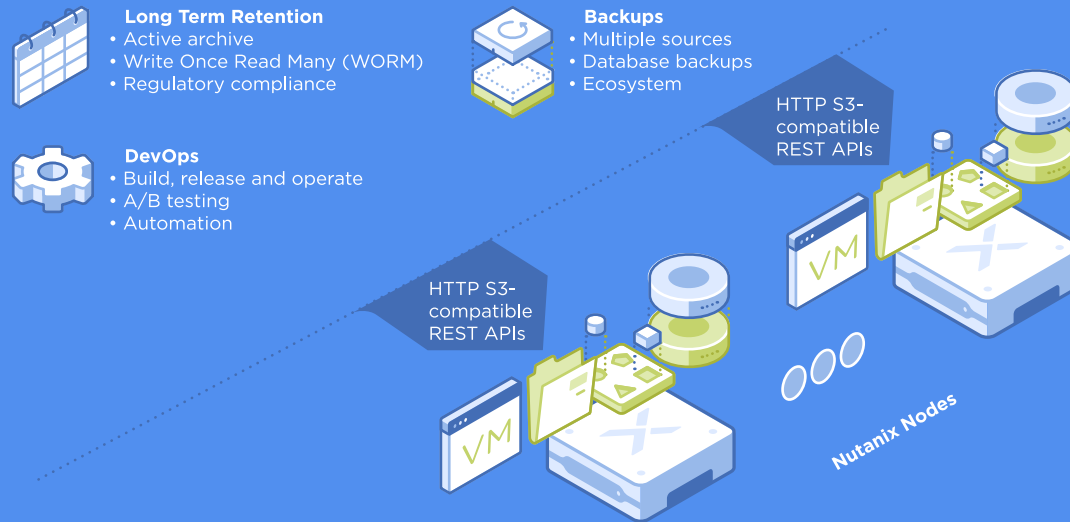
Nutanix Objects is:
- **Simple.** Enable private cloud users to provision buckets or create a single, globally accessible namespace for unstructured data within seconds.

- **Flexible.** Easily tailor object storage to different application scenarios within a single namespace.

- **Massively Scalable.** Scale-up and scale-out to store terabytes to petabytes of data.

Nutanix Objects tackles the unique challenges of unstructured data, delivering superior searchability, unlimited scalability, cost efficiency, and resilience.
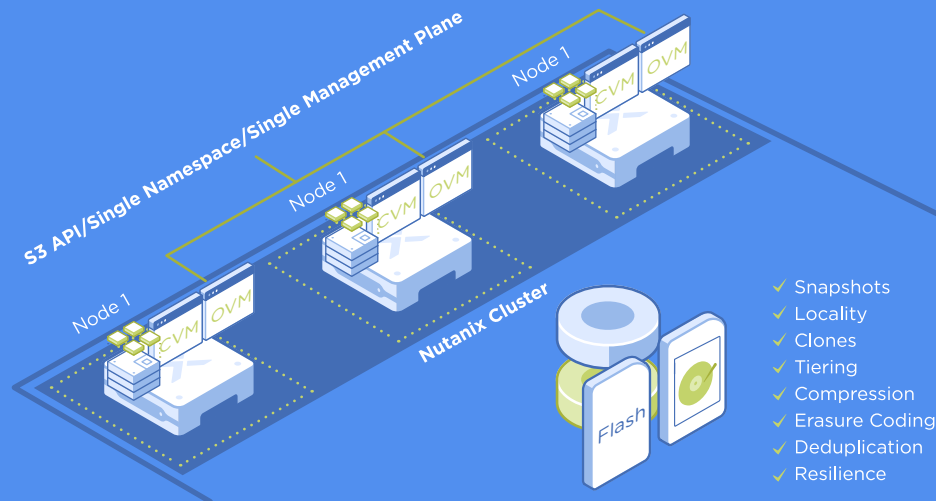
Objects supports the ability to create different object policies to address different application scenarios. The architecture is designed with scalability and ease of upgrade in mind.

Objects

Simple, flexible and intelligent enterprise file storage for your private cloud

Long Term Retention
• Active archive
• Write Once Read Many (WORM)
• Regulatory compliance

Backups
• Multiple sources
• Database backups
• Ecosystem

DevOps
• Build, release and operate
• A/B testing
• Automation

HTTP S3-compatible REST APIs

HTTP S3-compatible REST APIs

Nutanix Nodes

Objects is implemented using scale-out Object Volume Managers (OVMs) each running on a separate cluster node. This architecture allows seamless performance scaling either by adding more OVMs, or by increasing the CPU and memory resources allocated to each OVM.

S3 API/Single Namespace/Single Management Plane

Node 1

Node 1

Node 1

CVM OVM

Nutanix Cluster

Flash

✓ Snapshots
✓ Locality
✓ Clones
✓ Tiering
✓ Compression
✓ Erasure Coding
✓ Deduplication
✓ Resilience

An OVM consists of several components providing a single core function:

- **Frontend adapter.** Manages the S3-compatible interface, REST API calls, and serves as the client endpoint

- **Object controller.** Serves as the data management layer interfacing with the Nutanix OS and also coordinates with the metadata service

- **Metadata service.** Provides metadata management and a general key-value store, handles partitioning

- **Atlas.** Controls lifecycle management, audits, and background maintenance activities

You can deploy Nutanix Objects as part of a single Nutanix HCI cluster or as a standalone cluster to deliver high capacity and density for large-scale object storage needs.

A standalone cluster can function as part of your private cloud and/or serve other needs. A single Objects deployment can also be expanded to utilize spare capacity across multiple Nutanix clusters. The extent to which Objects can consume capacity from any secondary clusters is configurable to ensure Objects doesn't affect other workloads on those clusters.

Find Out More:
- nutanix.com/objects
- Objects data sheet
- Objects 2.0 (blog)

Nutanix Volumes

The largest storage challenge in private clouds built on traditional infrastructure is the need for Storage Area Networks (SANs) and separately managed block storage arrays. The equipment can be expensive to buy and often requires storage experts to manage and optimize operations. The cost, complexity, and expertise required can quickly compound as storage demands increase.

Block storage remains the preferred storage mechanism for many enterprise workloads. Enterprise applications such as databases rely on block storage for low-latency IOPS. Developers favor block storage when they need fast, efficient, and reliable data access.

One of the biggest advantages of a Nutanix private cloud is that it eliminates the need for a SAN and separate storage systems. Nutanix Volumes adds further flexibility to your private cloud deployment, enabling multiple, independent block storage volumes to be provisioned for databases and other applications that need them.

In addition to providing storage through the hypervisor, Nutanix also allows supported operating systems—inside or outside the Nutanix ecosystem—to access storage capabilities directly via Nutanix Volumes. Volumes is designed as a scale-out storage solution where every controller virtual machine (CVM, a dedicated VM on each node providing storage services) in a cluster can present storage volumes via iSCSI. This solution allows an individual application to access resources across an entire cluster, if needed, to scale out performance.

Volumes automatically manages high availability to ensure upgrades or failures are nondisruptive. Storage allocation and assignment for Volumes is done using volume groups (VGs). A VG is a collection of one or more disks (vDisks) in a Nutanix storage container. vDisks in a VG are load balanced across all CVMs in a Nutanix cluster by default.

In addition to connecting VGs through iSCSI, the Nutanix AHV hypervisor also supports direct attachment of VGs to VMs. The vDisks are presented to the guest OS via a virtual SCSI controller.

The use of iSCSI has several benefits. Servers accessing Volumes can utilize existing network infrastructure and native iSCSI software within supported operating systems. Use of iSCSI redirection also simplifies and automates load balancing and high availability, eliminating the need to leverage client-side tools like Multipath Input Output (MPIO).

Find out more:
- nutanix.com/volumes
- Volumes Data Sheet

Volumes

Scale-out block storage that eliminates the need for a separate SAN for legacy workloads

Consolidating Storage with Nutanix Private Cloud

Nutanix private cloud solutions are uniquely suited to meet your company's needs. Because Nutanix eliminates IT complexity, simplifies management, integrates data services, and improves data protection and security, it enables a private cloud to be more agile, more scalable, and—ultimately—more effective. Nutanix Enterprise Cloud reduces the cost of deploying and operating a private cloud while increasing service levels.

To begin designing data services for your private cloud you can start by answering a few simple questions:

- What data services will your private cloud require, now or in the future?
  – File
  – Object
  – Block

- If you are supporting developers, what data services do they need to consume?

- How much data will your private cloud need to store? If you have large unstructured storage needs, you may want to consider deploying a separate Nutanix HCI cluster or clusters dedicated for use by Nutanix Files and/or Nutanix Objects.

Using the information discussed in this guide, you can begin thinking about and planning a private cloud that meets these needs. Use the links provided in each section to dig deeper into specific topics.

To learn more about how Nutanix can help you transform your private cloud visit nutanix.com/private-cloud. You can contact Nutanix at info@nutanix.com, follow us on Twitter @nutanix, or send us a request at www.nutanix.com/demo to set up your own customized briefing.

Take a Test Drive
You can take a test drive of Nutanix infrastructure with no hardware, setup, or cost. Experience the simplicity and agility of public cloud combined with on-premises performance, security, and control via an easy-to-follow guided tour.

Test Drive

Private Cloud Design Guides in this Series:
- Automation
- Business Continuity
- Cost Governance
- Security

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